KT-84-039-(R)

42, 44, 46, 47

PROCEEDINGS OF A

SYMPOSIUM ON
APPLICATIONS OF ANOMALOUS PHENOMENA

November 30 - December 1, 1983

Leesburg, Virginia

C.B. Scott Jones, Editor

Published by:

Kaman Tempo
A Division of Kaman Sciences Corporation
Alexandria, Virginia
Santa Barbara, California

Approved For Release 2000/08/08 : CIA-RDP96-00788R001800140001-8

PSYCHOKINETIC RESEARCH AT SRI

E. May

Approved For Release 2000/08/08 : CIA-RDP96-00788R001800140001-8

Edwin C. May, Ph.D., is a senior research physicist in the Radio Physics Laboratory at SRI International. For over 8 years he has worked on parapsychological problems, first as a Research Associate in the Division of Parapsychology and Psychophysics of the Maimonides Medical Center in Brooklyn and now at SRI International. He has made research contributions in both nuclear and atmospheric physics, and in the area of parapsychology he has organized and designed experiments to test physics mechanisms behind psychic functioning, expecially on PK phenomena. Dr. May may be contacted at SRI International, 333 Ravenswood Avenue, Menlo Park, California 94025.

Approved For Release 2000/08/08 : CIA-RDP96-00788R001800140001-8

PSYCHOKINETIC RESEARCH AT SRI

Keeping the tradition alive, I'll tell you just a brief word or two about myself. I joined the SRI staff full time in June of 1976. Prior to that, in my earlier incarnation, I was a low-energy nuclear physicist, which doesn't mean I hung around labs moving very slowly; I investigated low-energy nuclear phenomena with nuclear scattering. With some overlap, I had about 5 years of work in clinical biofeedback research. So, it's somewhat of an eclectic background to bring to this area.

Just to remind you where we are, the whole area that we're talking about through this symposium is psychoenergetic phenomena, and we divide it into two modalities -- one of information acquisition, which we call remote sensing, and the other is action at a distance, which we're going to call remote action (RA).

We further divide RA into two distinct areas: Micro-remote action, which includes random number generator experiments that you heard about this morning from Dean Jahn; and large-scale phenomena, which we call macro-RA or macro-remote action. The things that fall into the latter category are the things you heard about from mainland China -- moving objects, bending metal, that sort of thing.

The first thing you'd like to do before undertaking an investigation like this is to see what others have done. So, we did two surveys at SRI covering a 10-year period (1970 through 1979) in both areas, large- and small-scale RA, and, in particular, random number generators (RNG). We found 216 experiments of RNG work that had been done prior to ours. In macro-RA there were some 65 papers in this area. These were reviewed laboratory experiments.

Unfortunately, in the large-scale macro-PK survey, it was very difficult to tell what was going on. I'm not sure of the reasons why. It could be because some of the experiments were poorly controlled, or simply due to a lack of reporting standards. It was just difficult to ascertain from the published papers alone what, in fact, did go on in this particular area. In those areas where positive results were claimed, however, they were usually very rare events -- an occasional case of metal bending, for example. Sometimes they involved specialized subjects, gifted individuals. And most frequently, with some notable exceptions, in all the papers that we saw, it required physical contact, certainly in the case of metal bending, between the subject and the target object. So, looking at the body of literature for the macro-RA was not too encouraging.

In the micro area, however, particularly random number generators, it's a different story. The experiments were easy to evaluate. Some of them were extremely well controlled and very well reported -- you heard some of those this morning. Positive results were reported by many different groups, which increases credibility. Positive results were reported by ordinary people just from the laboratory rather than specialized people. And you've already heard about the advantages of that.

What are the elements in a random number generator experiment? Using a coin analogy, we have a true random number generator, like a binary coin that you might flip. In our experiment it was a noise diode or a radioactive decay beta source. You need to analyze what you've done, and we feel that it's fairly important to provide feedback of the results using a biofeedback analogy. And lastly, and probably the most important, it appears that you need an individual as an RA-agent with intent to cause an effect.

Our physical system is shown in Figure 1. The shoeboxes contain the random sources. The display, the computer, and an individual with intent, our colleague, Beverly Humphrey, from SRI, are also shown. Actually, during a real experiment the RA-agent would sit more directly in front of the viewing screen. I'll come back to this figure from time to time.

Looking through the previous data, one of the problems that we encountered was that state-of-the-art scientific and physical controls were not brought to bear. So, our intent in this random number generator experiment, which, after all, was a replication of some 216 previous ones, was to bring to bear as much state-of-the-art physics and engineering controls as possible. Thus, should we see an effect, we would have some confidence that the effect was not due to some engineering glitch that we failed to notice. In that spirit, we spent approximately 6 months examining the noise diodes that we chose for the source of randomness in this experiment. Figure 2 shows the pulse height distribution produced by the noise diode as a function of temperature. This particular diode was invented by Haitz from Texas Instruments. We sent him our data and he sent us an interesting letter in return. He said he couldn't imagine anybody spending as much time as we did on his diode and he couldn't understand why since he had already derived all the equations. The results of our investigation agreed with what his theoretical investigations predicted of the diode. But, we wanted to make sure that we understood the operation of the diode from a physics perspective, and what could affect this diode from the outside in the normal physics and engineering sense. Besides looking at the temperature dependence of the diode, we subjected it to rather large magnetic fields, weak radioactive bombardment, mechanical vibrations, and so on. We discovered that, at least with regard to its frequency characteristics and its pulse height characteristics, the only thing that seemed to matter at all was temperature.

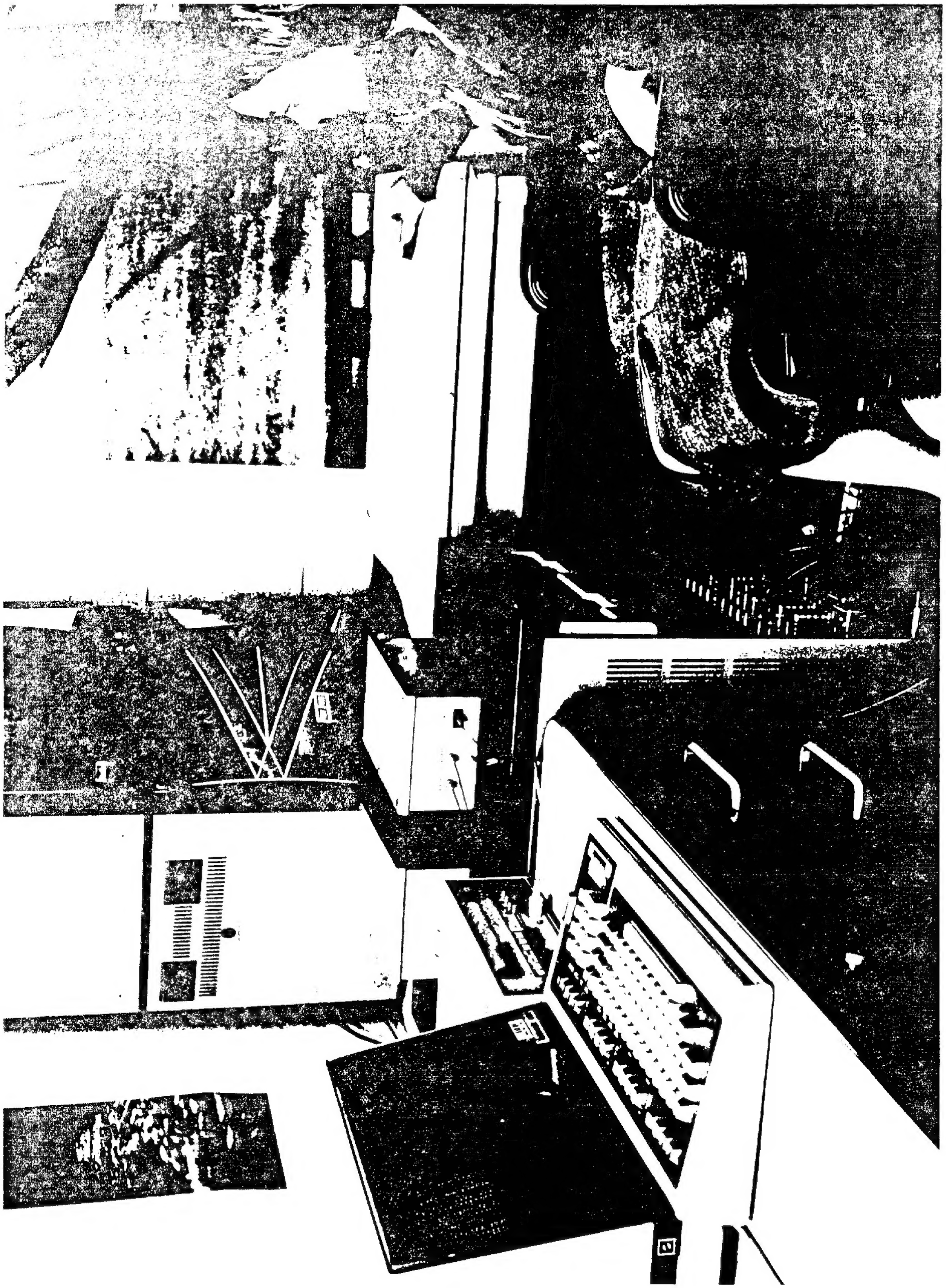


Figure 1. Physical setup of experimental equipment.

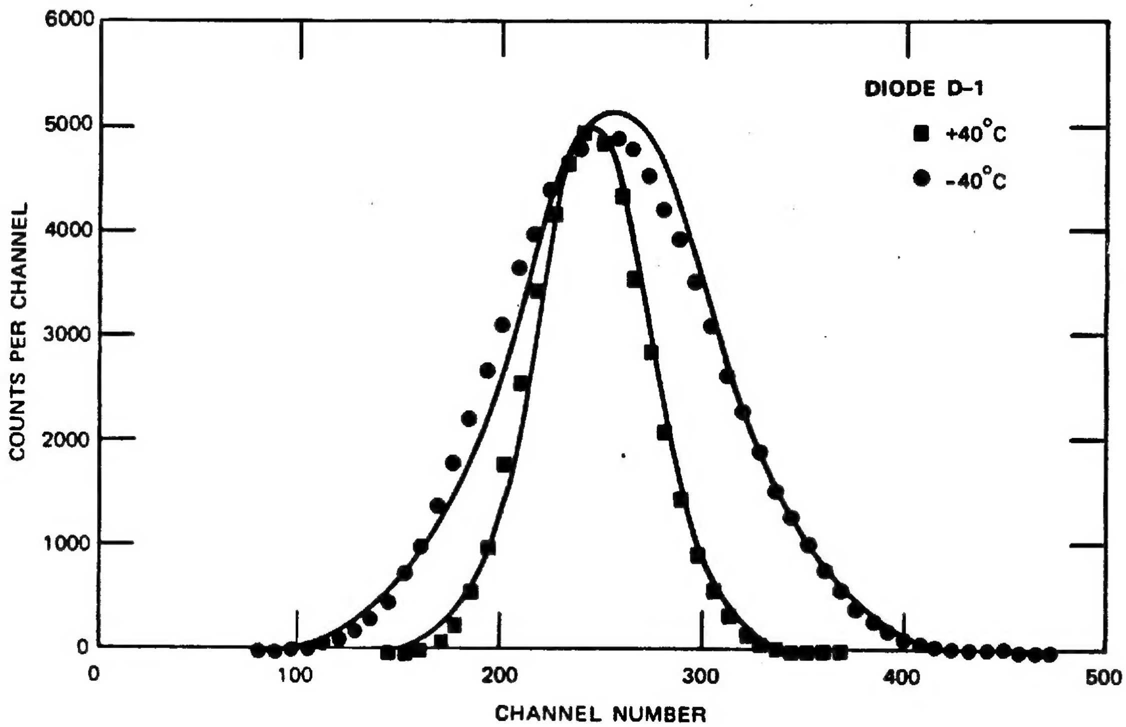


Figure 2. Pulse height distribution of filtered diode noise from -40 to +40°C

Going a step further, Haitz was able to supply us some of the basic theoretical concepts that allowed him to construct the diode. We expanded upon that from basic first principles in quantum mechanics and solid-state physics and developed a model. This model was dependent upon all known variables of both the construction parameters of that diode as well as the physics parameters of the PN junction. The model contained other solid-state parameters as well. Using this model, in principle, we could, after the fact, decide to raise the junction temperature by 100 degrees to see whether we could emulate our observed data. We hoped to gain an insight of the interactions down at the physics level.

Figure 3 shows you how good our model was. The solid line is a one-parameter fit, the effective mass of the electron. This is not psychic data; this is engineering data taken about the diode. At this point, at least with this particular set of diodes, we felt quite confident that we understood the behavior of the diode we are using and what influenced it from external sources.

The diode is contained in one of the metal shoeboxes shown in Figure 1. Those metal shoeboxes are eighth-inch soft iron lining with RF shielded, self-contained batteries, and the signals from the diodes come out to the computer by optical light pipes. There is no electrical connection at all between the diode and the environment. Since the diode was particularly sensitive to temperature, we monitored its temperature throughout the experiment. The reason why we're going to so much trouble is to make sure that should we see an effect in experimental conditions; we want to make sure that we can say, with some certainty, that it was not due to an electromagnetic pulse coming through the laboratory, or a temperature shift, or something of that nature.

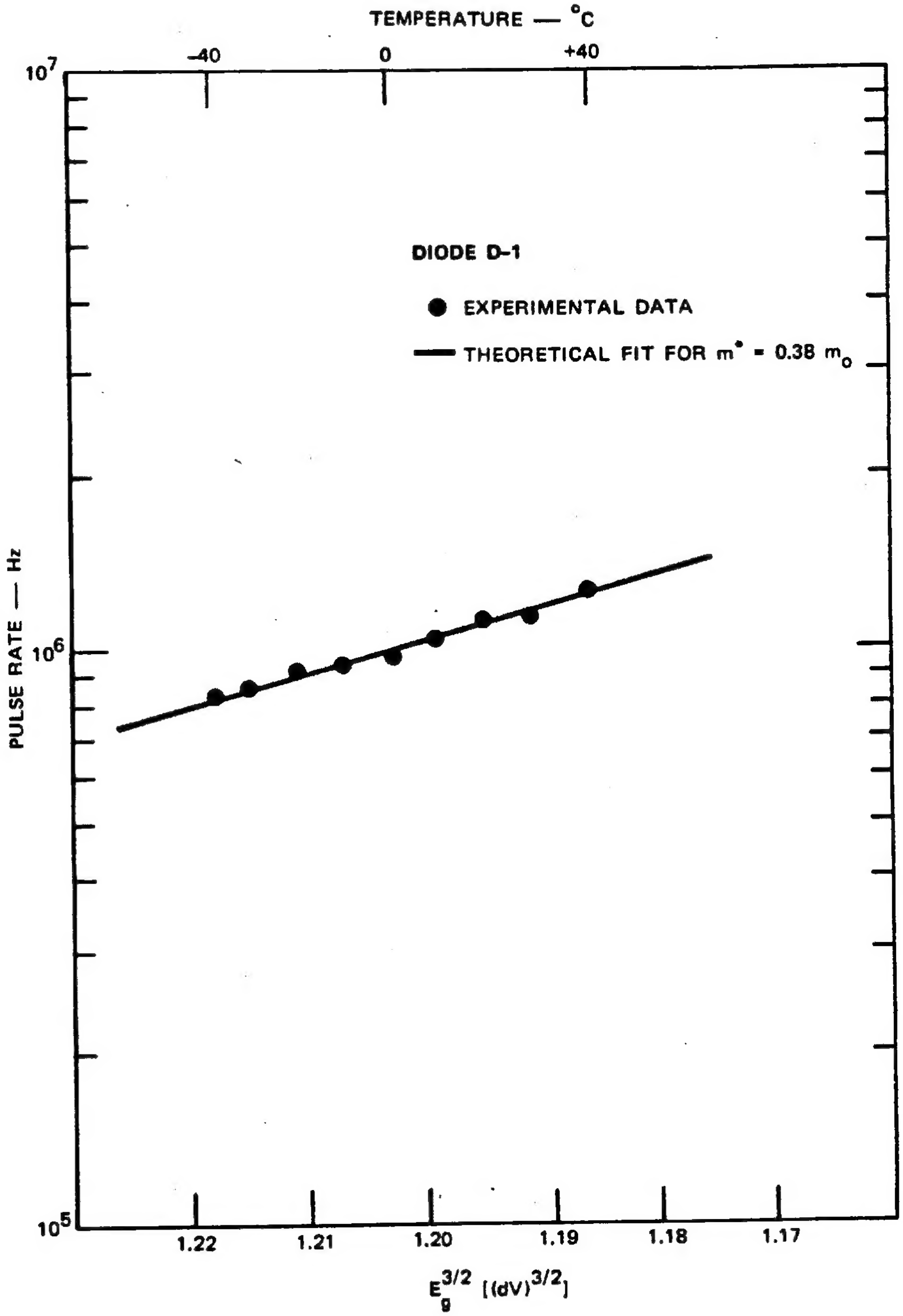


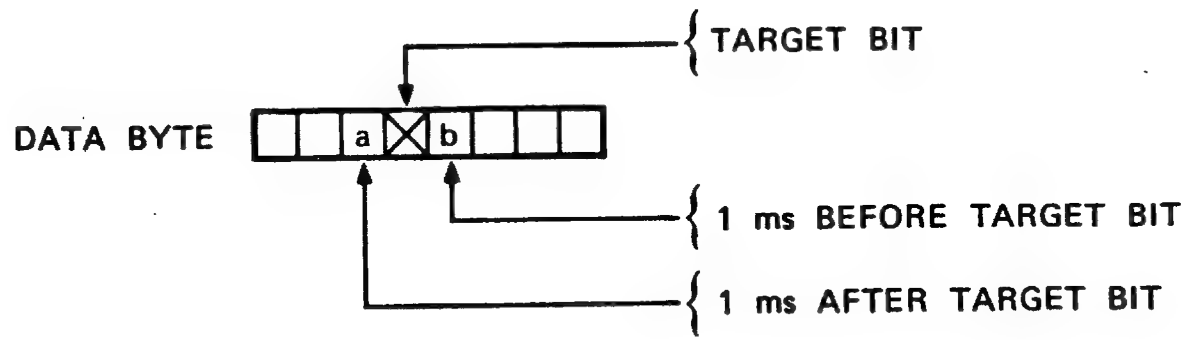
Figure 3. Log of the pulse rate as measured by frequency analysis plotted as a function of band gap.

As further precaution , we built into the source boxes a lot of fail-safe circuitry, so that if the battery voltage got too low, the apparatus would shut off catastrophically and require a manual reset. Catastrophic shutdown also occurred if certain bias currents in the diode got out of expected range or if the temperature got too high. The fail-safe circuitries that were inside the sources were further protection that we weren't looking at some sort of extraneous, anamolous, normal engineering phenomenon.

In our experiment the definition of our trial involved 3,000 binary samples of the bit stream coming from the random sources, and a run is defined as the 100 such trials. Having constructed this apparatus, however, you've got to make sure that it is in fact random.

Before I do that, however, I'm going to show you just briefly one slide (Figure 4) with a data byte on it. We collected one data byte every 8 milliseconds from the hardware. And we had agreed a priori that data bit number 4 was, in fact, the target bit throughout the entire experiment. We'll come back to this figure in a moment and I'll tell you what else is going on here. This is some of the evidence of the model that we're going to be proposing.

Next, I want to describe the view screen shown in Figure 1. Note the diagonal set of lines reproduced in Figure 5. It's beyond the scope of this presentation to go into detail of the statistical procedure we used. It does suffice to say, however, that sequential analysis, which is what we're using here, represents a procedure that is roughly 50 percent more efficient than the usual kinds of statistical procedures done in these experiments. What do I mean by efficient? I mean it requires 50 percent fewer trials to arrive at the same statistical conclusions than with the more traditional techniques.



RESULT: NEITHER BITS a NOR b SHOWED CORRELATIONS WITH TARGET BIT

- EFFECT WAS NOT ENVIRONMENTAL
- IF REMOTE ACTION IS MECHANISM, ITS TEMPORAL PROFILE IS LESS THAN 1 ms

Figure 4. Evidence for the intuitive data selection model.

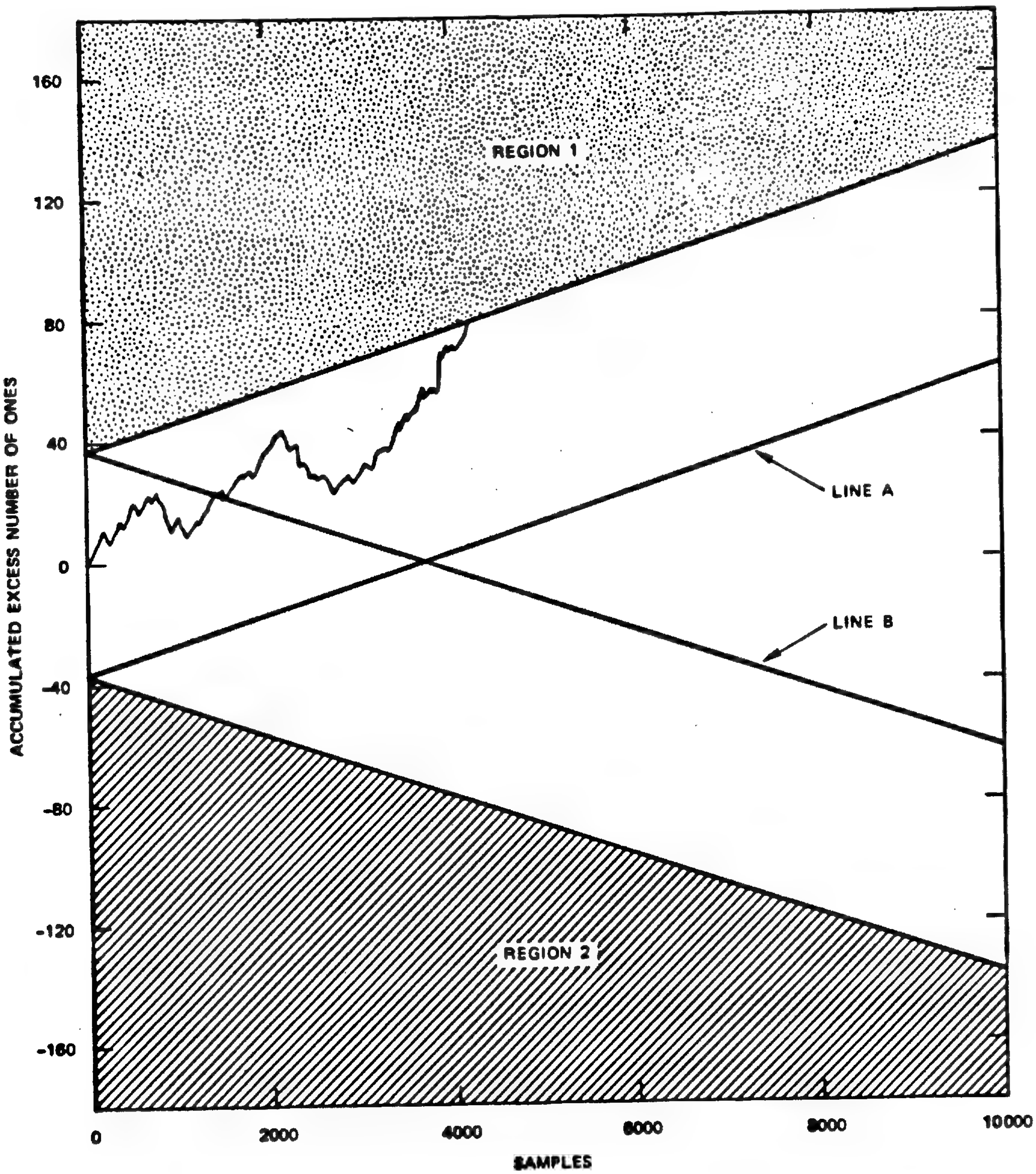


Figure 5. Example of a two-tailed sequential sampling plot.

These lines in Figure 5 represent decision lines derived from the formulation of sequential analyses theory. The y-axis represents the accumulated excess number of ones in the binary sequence, and the x-axis represents the number of samples. The expected path, of course, on the average, is a horizontal path with neither excess ones nor excess zeros. However, if the sequence starts producing excess ones, the path will be as drawn on Figure 5. If the sequence starts giving you an excess number of zeros, the path will be in the negative channel.

While data remain in one of the channels, not enough data has been collected to decide whether the sequence has been distorted. If the random walk enters region 1, sampling stops and you come to the statistical conclusion that the binary sequence for this particular trial, consisting of about 3,300 individual samples, was biased by about 4 percent, in our example, with a confidence of 95 percent.

Likewise, if the random walk enters region 2, sampling ends and the binary sequence for that run could be said to be biased with too few ones by about 4 percent, or having a total of ones of 48 percent. If the random walk crosses lines A and B of Figure 5, we'd say that particular sequence was not biased to within the statistical power that we'd stated in formalism for this experiment.

It's a little bit complex, but basically it's a precursor of the computer games. The idea is to "force" the random walk to enter region 1 or 2.

Before we had anyone attempt to do this, we wanted to make sure that the device we built was truly random. So, we applied six individual fixed-length tests: frequency, serial, gap, yule, D^2, and autocorrelation. The data stream was precisely what you would expect by chance in all of these tests.

Going further, we used the sequential analysis procedure, again prior to using anybody on the experiment, and we collected roughly 3,000,000 individual samples from this apparatus using the sequential analysis algorithm. Sure enough, it fell easily within chance expectation.

So at this point, what do we have? We have an apparatus that is impervious, as far as we know, to normal engineering considerations from the outside, and it meets the normally accepted definition of randomness.

There were two types of controls that we used throughout the experiment. One type of controls we label local controls. In other words, a formal session would be as follows: With no one present in the room, five control trials, trial meaning one sequential sampling decision, were collected with no one present. The way that was done was somewhat like Dean Jahn's automatic mode. The experimenter would initiate a run, go out of the laboratory and lock it, and then on a random protocol the machine by itself, trying to emulate a human pressing a button at kind of quasi-random moments, would go out and collect five trials and store them away for later reference. Then we'd have a 30-minute period where an individual would sit in front of the machine with his/her finger on a button. Except for pressing the button to initiate a trial there was no physical interaction with the hardware. After that was over, we would again collect five more trials with no one present in the laboratory. The before and after session trials represent the local controls.

Throughout the course of the experiment, which took approximately 3 months, we wanted to know whether the operation of the machine, its long-term stability, was still good. So we took a rather extensive number of trials, a thousand trials per RA-agent for a total of 7,000 trials (23,000,000 samples)

throughout the experiment to determine whether the stability maintained itself over that period of time. It did.

We did a survey of 17 people within the Radiophysics Laboratory at SRI, in a very informal atmosphere, and picked the best seven. What we defined as best was a little nebulous. But those best seven then took part in the formal series of experiments. Written protocols were in the hands of our client prior to the experiment. Each participant was asked to contribute 100 trials over the 3-month experimental period.

We were interested not only in whether the overall experiment would be significant, but were even more interested in whether individuals could produce significant results on their own. So, the precondition for this experiment to be successful was that at least two individuals out of seven had to produce independently significant results. They did (see Table 1).

Now, what's interesting is that the overall magnitude of the effect was something like 4 percent, which is a little bit larger than the previously published work. The statistical magnitude, the probability against chance that we see something real, is roughly about the same as all the earlier data. In our work, however, the data were collected under state-of-the-art engineering and methodological controls, and yet with that kind of control on the experiment, we observed the same order-of-magnitude results that had been published earlier.

What have we learned from this? I'm going to propose a model which we're calling intuitive data selection (IDS). Something, if you believe this data, is going on! It's consistent over a large number of laboratories, over an enormous data base, and the rough order of magnitude of statistics seems to be about the same. So, if something is, in fact, going on, what is it likely to be? There are two models you might propose. One is

Table 1. Experimental results.

Observer I.D.	Presession Successes/Trials	Session Successes/Trials
A	8/100	11/100
B	10/105	12/100
C	12/105	9/100
D	7/85	7/100
E[a]	8/105	17/100[a]
F[a]	9/95	16/100[a]
G	9/80	15/100

Note:
[a]Independently significant ($p \leq 0.035$).

causative. I think we all may have a causative model in mind when we think about PK -- reaching in somehow with your mind and mucking about with the apparatus. On the other hand, there's an alternative plausibility argument: in our experiments and in most others of that type what actually goes on is that an individual sits down in front of the apparatus and has complete determinism, or nearly so, when to press the button to initiate the experiment.

What I'm proposing here is an information transfer model that somehow, as we observed in Dean Jahn's presentation of his remote-viewing work, that information was independent of time. He observed good results whether the viewing was retrocognitive or precognitive. I'm proposing that the RA-agent in these experiments is gaining information about the future sequence that will be derived from the random source. And, as you know, in any random sequence sometimes it's very deviant, but if you take a large set of data it converges back to the mean. If you could select just those little substrings of slight deviation and stack them all up in one direction, you could get enormously statistically significant results. So, the results from

a seemingly fortuitous choice of when to initiate a run produce statistically significant deviations.

The evidence I have for this is all circumstantial, but it all points in the same direction. Referring back to Figure 4, the bits in the data byte were collected 1 millisecond at a time. This is a serial representation of collecting one data bit at 1-millisecond intervals. So, the data bit "a" represents 1 millisecond after the target bit was generated; data bit "b" is 1 millisecond before.

It seems plausible to argue, although there are some who will debate with me on this issue, that if this is a causative effect it is unreasonable to expect the causation to be isolated in time to exactly 1 millisecond or less. You would think, since no other human, conscious interactions occur over that fast a time scale, that there ought to be some slippage in time. If the RA-agent "zaps" it with a 5-millisecond pulse, there ought to be some effects in the neighboring bits.

We went back and looked at all the significant runs and there were no correlations whatsoever between neighboring bits and the target bit, even though the target bit deviated statistically from chance. So at least if there's a causative PK influence going on here, the time profile must be under a millisecond. If it were larger than a millisecond, then you would expect some correlation with the neighboring bits.

There are other pressing plausibility arguments as well. Using the model I discussed before, I mathematically changed every physical parameter that is known to solid-state physics with regard to that diode. I could not reproduce our results. By lowering the temperature of the diode by 20 degrees, I could not get any significant results looking at that bit, in model

space. By heating up the junction beyond the melting temperature of the junction itself, I couldn't get any deviation. By changing the electron mass, the mobility, or all the physical parameters that I could think of changing, electric field of the junction, could I reproduce our results. None of the known physical parameters could be modified in any way at all to simulate the data that we had seen in our experiment. I've identified five more similar components, but I'm running short on time.

Suppose that this model was correct, that at least in the random generator PK work that what we're dealing with is a data selection model rather than some sort of causative effect. What possible applications could you think of? Well, there are lots, actually. You could use your imagination rather furtively. If I could put a bit stream underneath a person's finger in an electronic situtation and stop it at just the right time, you could determine when a series of ones passed under his/her finger. Why that might be useful, I'll leave to your imagination. Making decisions of the form that we were talking about earlier, interrupting a bit stream of all ones that comes slipping under your finger and if you can land on that bit stream, you make one decision; if you don't land on that bit stream, you make another decision.

Finally, Dean Jahn mentioned earlier that he is beginning to look at pseudorandom shift registers. There has actually been a lot of work done in other laboratories and a little bit of work in the form of pilot work in our laboratory. We can rerun this exact experiment using computer program algorithms instead of natural sources of randomness. And what we discover is we get the same kind of statistical result as in the pilot work. And since it's a pseudorandom algorithm and you can save the seed that starts off the whole sequence of numbers, and then go back to check to see whether the expected sequence is

what you actually got during the experiment to determine whether there had been any causative effect at all on the computing hardware. What you discover is no, there is not! So, at least in our laboratory in pilot work there's no evidence at all that with these kinds of experiments people are disturbing, if you will, the transistor logic of the actual computing hardware.

Someone asked me this morning, how do you know you're just not mucking about with the displays rather than anything else? And that's kind of an interesting question, and a question which I think my last statement addresses.

QUESTION PERIOD

Question: As you know, I am very sympathetic to your conjecture with regard to the intuitive data selection. In your studies of Helmut Schmidt's random number generator work with micro systems, do you think that the intuitive data selection would also be the preferred interpretation of this result?

Response: I think so. I am going back and looking at this data base that we have of earlier work and plotting out the Z scores, or the probabilities of each of these experiments and counting them up across the 216 experiments. If they fall in the expected curve it is another data point in favor of intuitive data selection. I don't claim that intuitive data selection is the answer to absolutely all of it, but it is certainly suggestive at this point.

Question: On what you are saying, it seems to imply that the real key is when the person says "go," right?

Response: Yes.

Question: I wonder what would happen if you ran an experiment and you told the person he wanted to have mostly pluses. At some point that person was just walking in the room and the machine had already been running before he walked in and you controlled when he, in fact, walked in the room.

Response: A good question. In fact, I think some of the experiments that Dean Jahn has already addressed earlier today get at that point. The automatic mode, where you have one individual with one start point and a lot of runs. Is that what you mean?

Question: As I understood in his automatic mode, at some point the individual still said, "All right, commence the automatic mode now." What I am saying is, let another person or a

machine start the thing. Take away the freedom of choice and just see if the person is able to influence something that is right on its own.

Response: You move very quickly into the realm of philosophy here because somewhere, somehow, someone starts the experiment and since you don't know who, in fact, is, "the operative" in such a thing, even though it gets less and less likely from Ockham's razor perspective, that if I have the fifth cosmic ray and it hits my detector on the roof, that I set up next Wednesday and the experiment will start at that time, and it will give a run every 20 minutes and you have got to be there, somehow, whoever made that decision of the fifth cosmic ray, at least there is a slight hook left over. But I certainly agree that it becomes less and less plausible the more complex you become. In effect, it may be statistically possible that you can set a number of parameters in terms of run length and the number of runs so it becomes independent of start time, or at least less and less likely.

Question: I wanted to ask about your comments regarding the macro PK. John Hastead has done a very wide variety of stuff, much of which doesn't involve any touching. And no one seems to be trying to replicate any of that. Did you conclude that none of that was worth trying to replicate?

Response: Please don't misunderstand me. I am not saying that the work is worthless. In fact, there is a lot of good work there. I am saying from the published work, from the publications, which is what we were working from, you really can't tell. In a lot of the work by John Hastead, even though they are supposedly hands-off, they were under conditions where they were not being observed. So there were methodological flaws that may not, in final analysis, actually matter, but certainly matter up front when you are trying to determine what actually went on. I have discussed them at length with John, actually. I had a chance this summer.

Question: Getting back to your doing intuitive data selection, then if you ran runs of say 100 digits by some run of 1,000 digits, your operator ought to be able to get a much higher hit rate with the shorter runs.

Response: Yes.

Question: It is a higher probability that it will be statistically out of bounds. He ought to be able to do pretty well at picking them. And why can't he pick digit-by-digit?

Response: Good question. We would like to explore in that direction. I have not had the opportunity to go vertically into that direction. The only thing like that is to set up the pseudorandom thing where it can begin to control it. Clearly, you need to do this with the pseudorandom generator to at least close the potential door that you are actually mucking about in the hardware. That is high on our list and your statement is quite accurate.

Question: Whether it is causative or information transfers, there is an excellent selection mechanism readily available at your local video-arcade. The kids who do well on that ought to be red hot in your world.

Response: One of the things we are exploring maybe is setting up one of these devices in the hall outside our lab space and let people play on it.